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# वस्त्रादि — सीमित ज्वाला फैलाने की वस्तुओं से बनी उष्मा एवं ज्वाला से बचाव करने वाली वस्त्र सामग्री की अपेक्षाएँ — विशिष्टि

*Indian Standard*

# TEXTILES — REQUIREMENTS FOR CLOTHING MADE OF LIMITED FLAME SPREAD MATERIALS AND MATERIAL ASSEMBLIES AFFORDING PROTECTION AGAINST HEAT AND FLAME — SPECIFICATION

ICS 13.220.40; 59.080.30

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NEW DELHI 110002

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**Price Group 2**

Chemical Methods of Test Sectional Committee, TX 05

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

Limited flame spread materials and material assemblies are used in clothing in order to reduce the possibility of their burning and thereby itself constituting a fire hazard. These include clothing such as ladies' wear made of synthetic fibres and children wear of all kinds and also other protective clothing where protection against heat and fire mainly due to accidental contact with small igniting flames is required in circumstances where there is no significant heat and fire hazard.

The performance of such clothing is expressed in terms of a limited flame spread index. Following three indexes of performance have been covered:

a) *Index* 1 — Materials which do not spread flame but may form a hole on contact with a flame.
b) *Index* 2 — Materials and material assemblies do not spread flame and do not form a hole on contact with a flame.
c) *Index* 3 — Materials and material assemblies do not spread flame and do not form a hole on contact with a flame. They also give only limited after flame.

It is not possible to specify a higher index for materials and material assemblies which do not give any after flame or damage at all, because classification has been found to be inconsistent due to slight inter laboratory variations.

Index 1 materials are thermoplastics which do not spread flame, if accidentally contacted with a flame but do not protect the underlying material or skin. Index 1 materials should only be used as a part of Index 2 or Index 3 material assembly and should not be worn next to the skin.

Protective clothing may consist of several, separate dress materials or garments, or it may be a single dress material or garment with one or more layers. Normally it is sufficient for the outer material to have limited flame spread properties, and material assemblies from multi-layer clothing are tested by applying the flame to the outer surface. Optional alternative testing and marking requirements are given for material assemblies from dress materials or garments where there is a risk that inner layers might be exposed to flame contact (*see* **4.3**, **4.3.1.1** and **4.3.1.2**).

The limited flame spread properties of the textile materials and material assemblies are measured both before and after an appropriate cleansing or water soaking procedure and the procedure employed is indicated by a durability index.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# TEXTILES — REQUIREMENTS FOR CLOTHING MADE OF LIMITED FLAME SPREAD MATERIALS AND MATERIAL ASSEMBLIES AFFORDING PROTECTION AGAINST HEAT AND FLAME — SPECIFICATION

## 1 SCOPE

**1.1** This standard specifies the performance requirements for the limited flame spread properties of textile materials and material assemblies used in protective clothing affording protection against heat and flame.

**1.2** This standard is applicable to clothing such as ladies' wear made of synthetic fibres and children wear of all kinds and also other protective clothing where protection against heat and fire mainly due to accidental contact with small igniting flames is required in circumstances where there is no significant heat and fire hazard.

## 2 REFERENCES

The following standards contain provision which, through reference in the text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| *IS No.* | *Title* |
|---|---|
| 12467 (Part 2) : 2006 | Textiles — Assessment of the ignitability of upholstered furniture: Part 2 Ignition source: Match flame equivalent (*first revision*) |
| 15612 (Part 2) : 2006 | Textiles — Burning behaviour of curtains and drapes: Part 2 Measurement of flame spread of vertically oriented specimens with large ignition source |
| 15758 (Part 4) : 2007/<br>ISO 15025 : 2000 | Protective clothing: Part 4 Test method for limited flame spread |
| 15370 : 2005/<br>ISO 6330 : 2000 | Textiles — Domestic washing and drying procedures for textile testing |

## 3 TERMINOLOGY

**3.0** For the purpose of this standard, the following definitions shall apply.

**3.1 Limited Flame Spread Index** — A number indicating that the material or material assembly achieved one of the levels given in **7**.

**3.2 Durability Index** — A letter X or R indicating that the material or material assembly was subjected to a cleansing procedure specified in **6** before being tested for limited flame spread.

**3.3 Textile Material** — A single fabric or other product, for example one layer of a woven, knitted, or coated fabric or a multi-layered fabric or other product combined prior to the garment manufacturing process, for example a laminated or quilted fabric. A material test specimen represents or is taken from a single layer or a garment.

**3.4 Textile Material Assembly** — Two or more separate layers of the same or different materials. A material assembly test specimen represents or is taken from the various layers in a single garment or in a series of garments in a clothing system, assembled in equal size and in the order of use.

**3.5 Hole** — A break in the test specimen at least 5 mm × 5 mm in size caused by melting, glowing or flaming.

## 4 PERFORMANCE REQUIREMENTS

### 4.1 Textile Materials

All textile materials as described in **1.2** shall have a limited flame spread level 1, 2 or 3 when tested in accordance with IS 15758 (Part 4). Materials giving Index 1 shall only be used as part of a material assembly complying with Index 2 or Index 3 (*see* **4.2**) and shall be supplied with a statement that they shall not be used next to the skin.

### 4.2 Textile Material Assemblies

All textile material assemblies described in **1.2** shall have a limited flame spread Index of 2 or 3 when tested in accordance with IS 15758 (Part 4) with the flame applied to the outer face.

### 4.3 Optional Requirements

**4.3.1** If agreed to between the buyer and the seller, the textile material assembly shall meet either of the following requirements specified in **4.3.1.1** or **4.3.1.2** instead of those specified in **4.2**.

**4.3.1.1** The textile material assembly shall have a limited flame spread Index 2 or 3 when tested in accordance with IS 15758 (Part 4) with the flame applied to the outer face and to the inner face.

**4.3.1.2** The entire textile material assembly shall have a limited flame spread Index 2 or 3.

### 4.4 Durability

All textile materials and material assemblies, shall meet these requirements both before and after the appropriate cleansing procedure X or R in accordance with **6**. The limited flame spread index quoted shall be the lowest value determined either before or after cleansing.

## 5 SAMPLING

### 5.1 Lot

The quantity of same kind of textile material or material assembly delivered to a buyer against one dispatch note shall constitute a lot.

### 5.2 Textile Material

A representative sample of sufficient size to provide the required two sets of six specimens shall be drawn randomly from the lot as per relevant Indian Standard on material specification or as agreed to between the buyer and the seller.

### 5.3 Textile Material Assemblies

Sufficient quantity of each material in the assembly or sufficient number of garments of the same type shall be taken so as to provide the required two sets of six specimens.

NOTES

1 This standard is designed to assess the performance of the textile material or material assembly used in the clothing or the garment and not the garment construction. Specimens taken from the clothing or the garments should be typical of the their construction, but should not include seams, closure systems, or specific garment design features.

2 Additional sets of specimens as needed if material assemblies are to be tested on both the outer and the inner faces (*see* **4.3.1**).

### 5.4 Test Specimen Size

The specimen size shall be 200 ± 1 mm by 160 ± 1 mm. An alternative 80 mm wide specimen may only be used on materials and material assemblies which do not burn to the side edges of the narrower specimen.

## 6 PROCEDURES FOR DURABILITY TO CLEANSING OR WETTING

**6.1** The textile materials or material assemblies shall be tested both before and after a cleansing procedure, in accordance with **6.2** or **6.3**.

**6.2** The sample shall be submitted to at least five wash cycles of the cleansing procedure given in the care label. If no cleansing procedure is prescribed, the material shall be submitted to twelve wash cycles of one of the standard cleansing procedures prescribed in **6.2.1** or **6.2.2** as appropriate to the fabric.

**6.2.1** Standard wash procedure according to procedure No. 6A (40 ± 3°C) and flat dried in accordance with procedure C of IS 15370. Textile materials and material assemblies tested after this procedure shall be marked with the letter X.

NOTE — It is possible to modify the washing procedure by carrying out wash cycles using a washing temperature conforming to manufacturer's maintenance instructions. In such cases the durability index shall be in the form: number of wash cycles, letter X, wash temperature in °C.

**6.2.2** The textile materials or material assemblies, other than those covered in **6.2.1** which are adversely affected by washing, shall be tested after water soaking in accordance with the procedure described in Annex D of IS 12467 (Part 2) followed by five dry cleaning cycles in accordance with the procedure specified in Annex C of IS 15612 (Part 2). Textile materials and assemblies tested after this procedure shall be marked with the letter R.

NOTE — Textile materials and assemblies treated with flame retardants which are not durable to wetting with water are considered unsuitable for use in type of clothing covered by this standard.

## 7 CLASSIFICATION

### 7.1 Requirements for Limited Flame Spread Index 1

The textile material or material assembly shall meet the following requirements:

a) No specimen shall permit any part of the lowest boundary of any flame or hole to reach the upper or either vertical edge.
b) No specimen shall give flaming debris.
c) Any afterglow shall not spread from the carbonized area to the undamaged area after the cessation of flaming.

### 7.2 Requirements for Limited Flame Spread Index 2

The textile material and material assembly shall meet the following requirements:

a) No specimen shall permit any part of the lowest boundary of any flame to reach the upper or either vertical edge.
b) No specimen shall give flaming debris.
c) Any afterglow shall not spread from the

carbonized area to the undamaged area after the cessation of flaming.

d) No specimen shall give hole formation.

### 7.3 Requirements for Limited Flame Spread Index 3

The textile material and material assembly shall meet the following requirements:

a) No specimen shall permit any part of the lowest boundary of any flame to reach the upper or either vertical edge.

b) No specimen shall give flaming debris.

c) Any afterglow shall not spread from the carbonized area to the undamaged area after the cessation of flaming.

d) No specimen shall give hole formation.

e) Mean after flame time of any set of six specimens shall not exceed 2 s.

## 8 MANUFACTURER'S INFORMATION

### 8.1 Single Layer Textile Materials

All single layer textile materials in accordance with this standard shall be supplied with the following information:

a) Manufacturer's name, trade-mark or other identifying mark;

b) Material's limited flame spread index and the durability index or the letter R or X, for example 3/X indicates material meets flammability Index 3 after 12 washes at 40°C; 2/5X60 indicates meets flammability Index 2 after 5 washes at 60°C;

c) Instructions for the care and cleansing of the material, in agreement with the durability index quoted above, and with particular emphasis on any special precautions to be taken; and

d) If the material is classified in as Index 1, a statement 'Use only over Index 2 or 3 material and do not use next to the skin'.

### 8.2 Textile Material Assemblies

All textile material assemblies in accordance with this standard shall be supplied with the information in **8.1** but with the statement required under **8.1**(b) modified to:

> 'Textile material assembly Index: Outer face tested', as appropriate. Optionally, if the requirements of **4.3.1.1** are satisfied the statement shall be: 'Textile material assembly Index: Outer face tested and index: Inner face tested'. Optionally, if the requirements of **4.3.1.2** are satisfied the statement shall be: 'Index of each textile material in the assembly for each layer'.

**8.2.1** The presence of any Index 1 textile material in the assembly shall be indicated.

NOTE — The flammability indices given in this standard may be used by material manufacturers to indicate the flame spread behaviour of their materials. They may also be used by protective clothing manufacturers to indicate the flame spread behaviour of the material or material assembly used in protective clothing. The use of marking on a garment openly indicates the limited flame spread properties of the textile material or material assembly used in its construction.

## ANNEX A

### (*Foreword*)

### COMMITTEE COMPOSITION

Chemical Methods of Test Sectional Committee, TX 05

| *Organization* | *Representative(s)* |
|---|---|
| Textiles Committee, Mumbai | Dr G. S. Nadiger (***Chairman***)<br>Shri E. Viswambharam (*Alternate*) |
| Ahmedabad Textile Industry's Research Association, Ahmedabad | Director |
| Bapuji Institute of Engineering and Technology, Davangere | Dr H. L. Vijaykumar<br>Dr K. Murugesh Babu (*Alternate*) |
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| Central Pollution Control Board, Delhi | Dr M. Q. Ansari<br>Shri Ajay Aggarwal (*Alternate*) |

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| Indian Institute of Carpet Technology, Bhadohi | Prof (Dr) K. K. Goswami<br>Shrimati Betty Das Gupta (*Alternate*) |
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